

THE ISOPOD GENUS *DYNAMENE* FROM AUSTRALIAN WATERS, WITH  
DESCRIPTION OF A NEW SPECIES FROM CORAL REEFS

D.M. HOLDICH

and

K. HARRISON

Department of Zoology, The University, Nottingham, England.

ABSTRACT

A new species of the isopod genus *Dynamene*, *D. curalii*, is described from the coral habitat of Heron Island and Lizard Island in Queensland. The only other species of this genus known from the Southern Hemisphere, *D. ramuscula* Baker from South Australia, is redescribed. It is noted that the two Australian species differ markedly in one of the diagnostic characters when compared with species from Europe and N.W. Africa.

Seven species of the sphaeromatid isopod *Dynamene* Leach, 1814 are known to date (Holdich 1968a, 1970). Of these species *D. bidentata* (Adams) is known only from the Atlantic coasts and islands of N.W. Africa and Western Europe; *D. magnitorata* Holdich from the coasts of continental Western Europe (Holdich 1976), the Azores, and Mediterranean; *D. edwardsi* Lucas has been recorded from Atlantic coasts of Europe and N.W. Africa but mainly occurs in the Mediterranean, Aegean and Red Sea; *D. bifida* Torelli and *D. tubicauda* Holdich appear to be restricted to the Mediterranean; and *D. torelliae* Holdich occurs in the Mediterranean, Adriatic, Aegean, and also extends into the Black Sea. These species therefore appear to be restricted in their distribution to Western Europe, N.W. Africa and the Mediterranean and adjacent seas. There have been frequent misidentifications in the past (Holdich 1968a for review) but the only valid record for a species outside that area is *D. ramuscula* Baker from South Australia. This species appears, from the literature, to closely resemble *D. bifida*.

The only low latitude record for a *Dynamene* species is for *D. edwardsi* from southern Spanish Sahara (latitude 22°N). In this paper a new species is described from coral reefs in Queensland, Australia which appears to have a tropical and sub-tropical distribution. When comparing the new species with the type specimens of *D. ramuscula* it was discovered that

the latter species in fact differs notably from *D. bifida* and a redescription was considered necessary.

SYSTEMATICS

Order ISOPODA

Family SPHAEROMATIDAE

Sub-family EUBRANCHIATINAE

*Dynamene* Leach, 1814

GENERIC DIAGNOSIS

Eubranchiate sphaeromatid with body approximately elliptical. Anteriorly, cephalosome separating the bases of the antennules. Eyes set slightly into pereonal tergite 1. Coxal plates of pereonites 1-7 separated from tergites by sutures. Pereonal tergite 7 reduced, not reaching lateral margins of body. Each side of the pleonal tergite bearing two short, postero-lateral incisions. Pleotelson domed, bearing an obvious terminal notch which may be enclosed forming a tube. Antennular peduncle articles 1 and 2 dilated and juxtaposed to ventral margin of cephalosome. All pereopods ambulatory. Both rami of pleopods 1-3 bearing margin of plumose seate. Endopods of uropods juxtaposed to pleotelsonic margin; exopods posteriorly directed. Sexual dimorphism pronounced. Adult male with pereonal tergite 6 longer than those preceding, posterior margin with an elongate, posteriorly

directed process either side of mid-line. Pleotelson bearing transverse, bilaterally symmetrical ornamentation. Penes small, separate. Endopod of pleopod 2 lacking appendix masculina. Ovigerous female with pereonal tergite 6 similar to those preceding. Pleotelson smooth. Young incubated in a marsupium, formed from four pairs of lamellae which arise from pereonites 1–4. Mouthparts strongly metamorphosed.

#### *Dynamene curalii* sp. nov.

##### MATERIAL EXAMINED

HOLOTYPE: Queensland Museum QM W6319, male, from *Lithothamnion* sp. behind reef crest, intertidal, Heron Island, SEQ, D.M. Holdich, 15 April 1976.

ALLOTYPE: QM W6320, ovigerous female, same data as Holotype.

PARATYPES: QM W6321, juvenile, from *Halimeda* sp. behind reef crest, intertidal, Heron Island, SEQ, D.M. Holdich, 15 April 1976. QM W6322, sub-adult male, behind reef crest opposite research station, intertidal, Heron Is., SEQ, N. Bruce, 6 June 1978. QM W6323, non-ovigerous female, same data as W6322.

##### OTHER MATERIAL

Heron Island, Queensland, from *Lithothamnion* sp. behind reef crest, Intertidal, 4 adult males, 2 ovigerous females, 1 juvenile, Coll. D.M. Holdich, 15 April 1976. North Point, Lizard Island, Queensland, On *Halimeda* sp. associated with coral at 9.0 m, 1 sub-adult male, Coll. B. Barnett, 8 June 1976. Heron Island, Queensland, Behind reef crest opposite research station, Intertidal, 2 adult males, 1 sub-adult male, 4 ovigerous females, 2 juveniles, Coll. N. Bruce, 6 June 1978.

##### DESCRIPTION

ADULT MALE: (Figs. 1a – c, f – h; 2d – v). Body deeply vaulted, not depressed. Dorsal surface and lateral margins bearing long setae. Frontal region of cephalosome, between antennules, sub-equal in width to labrum. Pereonal tergite 1 sub-equal in length to cephalosome and twice as long as tergite 2. Tergites 2–5 sub-equal. All coxal plates directed ventrally, not expanded. Pereonal tergite 6 three times as long as tergite 5 and rugose in its posterior half. Posterior projections rugose, simple (i.e. not bifid), widely separate, just more than half length of tergite. Posterior tergal margin, lateral to the projections, straight, bearing no secondary projections. Postero-lateral margin of pereonal tergite 7 as a simple lobe, not bifid. Pleonal tergite rugose laterally. Pleotelson bearing a short, simple or multispined tubercle either side

of the mid-line. Pleotelsonic foramen with sub-triangular, serrate lip; entirely enclosed ventrally, forming a tube.

Antennule with peduncle articles 1 and 2 setose; 1 slightly longer than 2, bearing a distal inferior spine; 2 bearing a proximal, inferior, curved spine and a distal infero-dorsal spine. Distal region of article 2 acute. Antennular flagellum of six articles, 2–5 each bearing one long aesthetasc. Antennal peduncle not expanded; flagellum of seven articles, last very reduced.

Mouthparts: labrum slightly wider than long with setose distal margin; proximal region set into the broad epistome which has a straight anterior margin. Mandibles with incisor processes, molar processes and palps well developed. Maxillule with tip of inner lobe bearing four pectinate setae and outer lobe bearing approximately ten stout, curved spines. Maxilla with two outer lobes bearing long, curved, robust, simple setae, and inner lobe bearing eight long, robust, pectinate setae. Maxillipedal endite four times as long as broad with stout, plumose, apical setae. Inner margin bearing one coupling hook. Palp of five articles; 1 reduced, 2–4 bearing pronounced, narrow lobes, 2–5 with apical, plumose setae. Pereopods all ambulatory, first slightly more robust than remainder. Dactylus of each with pronounced secondary unguis. Merus, carpus and propus bearing stout setae on superior and inferior surfaces. Penes small, separate.

Pleopods: pleopod 1 with internal margin of basis extended medially beyond rami, bearing three coupling hooks. Rami sub-elliptical, each bearing apical, plumose setae equal in length to ramus, lateral simple setae and several long, non-marginal setae. Endopod two-thirds length of exopod. Basis of pleopod 2 bearing three coupling hooks. Endopod sub-triangular; exopod ovate with several proximal, non-marginal setae. Both rami bearing long, plumose, terminal setae. Basis of pleopod 3 rectangular with three coupling hooks. Endopod sub-triangular, twice as long as elliptical exopod. Both rami with terminal, and exopod also with external, plumose setae, those on exopod twice as long as those on endopod. Both rami of pleopod 4 sub-ovate, bearing respiratory folds along entire length. Apex of exopod thickened, toothed; external margin with proximal, toothed process. Apex of endopod acute, curved medially. Both rami of pleopod 5 extensively pleated. Endopod sub-elliptical with apex broadly rounded, bearing fine setae. Exopod sub-ovate with three very pronounced, toothed apical processes. Both rami of all pleopods lacking articulations. Uropods

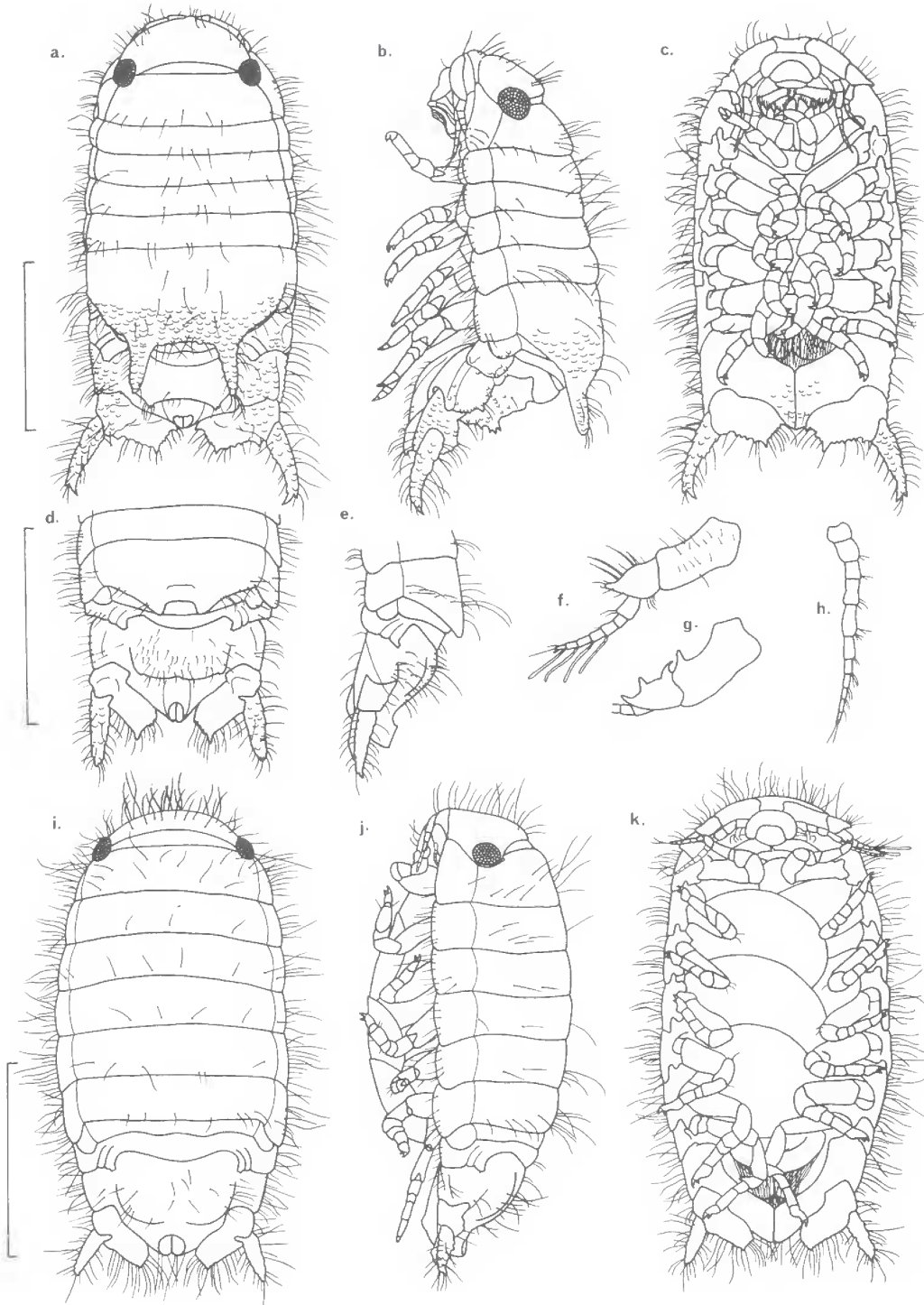


FIG. 1: *Dynamene curalii* sp. nov. Adult male (a) dorsal, (b) lateral, (c) ventral, (f) right antennule, ventral view, (g) right antennular peduncle, antero-dorsal view, (h) left antenna. Sub-adult male posterior region (d) dorsal, (e) lateral. Ovigerous female (i) dorsal, (j) lateral, (k) ventral. Scales represent 1 mm.

with wide, rectangular endopods, each internal corner bearing a pronounced spine. Margins straight or markedly spined, setose. Exopod setose, rugose, sub-cylindrical, tapering to an acute, medio-dorsally directed apex bearing a short, external, accessory spine.

Body length: 2.44 mm.

**SUB-ADULT MALE:** (Fig. 1d, e). Pereonatal tergite 6 twice as long as 5, posterior margin bearing a short, blunt projection either side of the mid-line. Projections on pereonatal tergite not contiguous. Pleotelson domed, setose, lacking obvious rugosity and ornamentation. Pleotelsonic foramen sub-circular, smooth-lipped. Penes present as minute separate papillae. Uropod with rectangular endopod bearing a spine on the medio-posterior corner. Exopod sub-cylindrical, rugose, sub-equal in length to endopod, with a curved, acute tip.

Body length: 2.12 mm.

**OVIGEROUS FEMALE:** (Figs. 1i-k; 2w-z). Pleotelsonic foramen sub-circular, directed dorsally, completely enclosed ventrally forming a tube. Pereopods as in male, no obvious increase in setation. Four pairs of brood lamellae well developed, overlapping considerably in mid-line. Approximately twelve eggs in brood pouch. Uropod with rectangular endopod, either lacking spines or with a single medio-posterior spine. Exopod rugose, sub-cylindrical, sub-equal in length to endopod, lacking curved, acute tip.

Body length: 2.3 mm.

**NON-OVIGEROUS FEMALE:** (Fig. 2a, b). Pleotelson more domed than in ovigerous female, with foramen sub-circular, smooth-lipped, directed postero-dorsally. Antennule bearing two aesthetascs. Exopod of uropod with acute terminal spine.

Body length: 2.48 mm. There is a tendency for some *Dynamene* species to decrease slightly in apparent length at the ovigerous moult (Holdich 1968b) hence the difference in the lengths of the non-ovigerous and ovigerous females recorded here.

**JUVENILE:** (Fig. 2c). Body slightly depressed, coxal plates directed laterally. Pleotelsonic foramen sub-circular, directed posteriorly. Exopod of uropod acute, sub-equal to endopod.

#### REMARKS

*Dynamene curalii* can be separated from all known species of *Dynamene*, except *D. tubicauda*, by the lack of a central pleotelsonic boss in the

adult male. Unlike *D. tubicauda*, however, the adult male of *D. curalii* is not depressed, the anterior region of the cephalosome is not extended as a shelf and the exopods of the uropods bear incurved, acute apices. (See also remarks following *D. ramuscula*).

**ETYMOLOGY:** *Dynamene* + *L. curalii* i.e. of coral.

#### ECOLOGY AND LIFE-CYCLE

On Heron Island this species occurs intertidally on and behind the reef crest. As with other *Dynamene* species (Holdich 1968b, 1970, 1976) the adults take up a cryptozoic existence for the terminal reproductive phase of their life-cycle, occupying small cavities amongst dead coral and lithified algae. In some cases the habitats are exposed to strong wave action.

As the ovigerous females undergo marked degeneration at the ovigerous moult (as in other species of *Dynamene*) they probably die after release of the brood. Juveniles, after release from the brood pouch, settle and feed on various species of algae on the reef. It is not known how long the growth phase of the life-cycle is, or whether males spend one or two breeding seasons in the reproductive habitat.

On Lizard Island two sub-adult males were collected (one subsequently escaped) from sub-littoral algae thus indicating that *D. curalii* is not restricted to the intertidal zone.

Other species of isopod which have a biphasic life-cycle occur in similar reproductive habitats to *Dynamene* and probably compete with it for space. Notable amongst these is the genus *Gnathia* Leach which has recently been found to be a common element in cryptic habitats in Queensland (Holdich and Harrison, 1980).

#### *Dynamene ramuscula* Baker, 1908

*Dynamene ramuscula* Baker, 1908, pp. 45-6, 161, pl. 5; Hale, 1929, pp. 293-4; Monod, 1932, p. 64; Holdich, 1968a, pp. 412-3; 1970, p. 422.

*Dynamene ramusculus* Nierstrasz, 1931, p. 211. (Unjustified emendation).

#### MATERIAL EXAMINED

South Australian Museum reg. no. C.355. 2 males, 2 ovigerous females, St. Vincent Gulf, South Australia. On sponges.

#### DESCRIPTION

**ADULT MALE** (Fig. 3a-k, n-p). Body deeply vaulted, not depressed. Dorsal surface, uropods

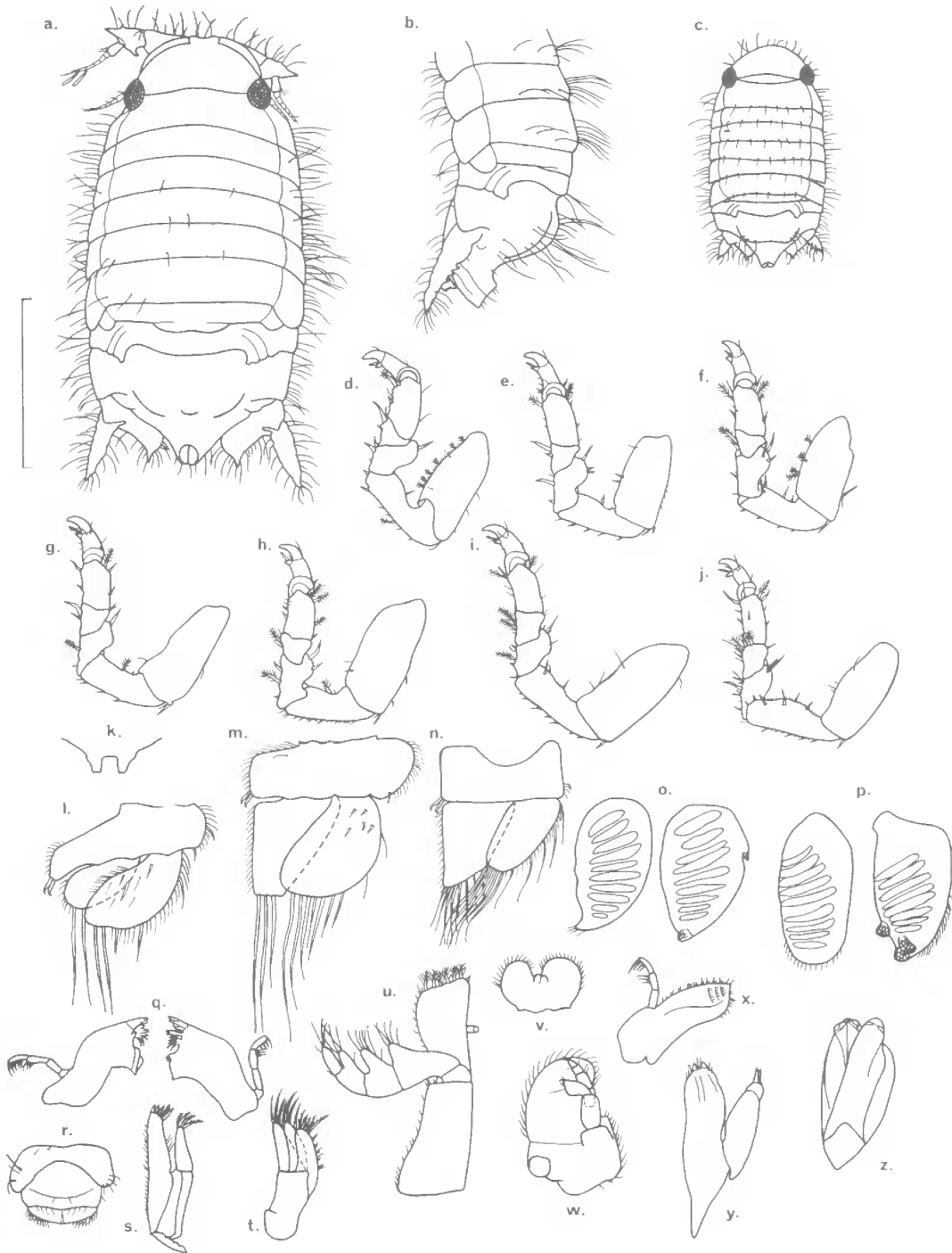


FIG. 2. *Dynamene curalii* sp. nov. Non-ovigerous female (a) dorsal, (b) lateral, posterior region. Juvenile (c) dorsal. Adult male (d-j) pereopods 1-7 respectively, (k) penes, (l-n) pleopods 1-3 respectively, (o) rami of pleopod 4, (p) rami of pleopod 5, (q) mandibles, posterior view, (r) labrum and epistome, (s) maxillule, (t) maxilla, (u) maxillipede, (v) paragnaths. Ovigerous female (w) maxillipede, (x) mandible, (y) maxillule, (z) maxilla. Scale represents 1 mm.

and ventral surface of pleotelson bearing long setae. Frontal region of cephalosome, between antennules, narrow, one quarter width of labrum. Pereonal tergite 1 sub-equal in length to cephalosome and twice as long as tergite 2. Tergites 2-5 sub-equal, each rugose in posterior half. All coxal plates directed ventrally, not expanded. Pereonal tergite 6 more than twice as long as tergite 5, rugose. Posterior projections sinuous, contiguous in mid-line, diverging distally, sub-parallel terminally, each bearing a ventrally directed, sub-terminal, accessory projection. Posterior tergal margin bearing a slight, rugose tubercle mid-way between projection and coxal plate on each side. Postero-lateral margin of pereonal tergite 7 as a simple lobe, not bifid. Pleonal tergite rugose, obscure in dorsal view. Pleotelson rugose, having a quincunx of acute, conical tubercles, the central being the largest, with a smaller, conical tubercle anterior to the basis of each uropod. Pleotelsonic foramen sub-triangular, closed ventrally forming a tube.

Antennular peduncle with article 1 having a short, blunt, distal, inferior spine; 2 with a larger, wide, proximal, inferior spine and a blunt apex. Flagellum of eight articles, 3-8 each bearing a single aesthetasc. Antennal peduncle not expanded, flagellum of nine articles, distal article reduced.

Mouthparts: labrum sub-circular, semi-enclosed by V-shaped epistome. Mandible with well formed incisor process, molar process and palp, Palp article 2 with five distal, inferior setae. Left mandible with tridentate incisor process, tridentate lacinia mobilis and setal row of six pectinate setae. Maxillule and maxilla of usual sphaeromatid form. Maxillipedal endite four times as long as broad. Palp articles 2-4 with pronounced superior lobes, relatively longer than those of *D. curalii* sp. nov. Pereopods all ambulatory, first slightly more robust than remainder, with reduced carpus and inferior margins of merus, carpus and propus bearing long, stout, simple spines. All pereopods with pronounced secondary unguis, 2-7 with variable setation on inferior margins. Penes short, widely separate at base.

Pleopods: pleopod 1 with internal margin of basis not extending medially beyond rami. Rami sub-elliptical with long, terminal and external, marginal, plumose setae. Endopod three quarters length of exopod. Pleopod 2 with endopod sub-triangular, exopod sub-ovate. Rami sub-equal in length, each bearing long, terminal and external setae. Pleopod 3 with endopod twice length of exopod. Endopod sub-triangular with short,

terminal, plumose setae. Exopod sub-ovate with terminal, plumose setae extending beyond tip of endopod. Pleopod 4 of specimen damaged, but external margin of exopod having proximal, toothed process. Both rami of pleopod 5 with respiratory folds. Endopod sub-elliptical with apical border of short, fine setae. Exopod sub-elliptical with truncate base. Apex as a short, wide, toothed region with a prominent sub-terminal toothed process and a toothed region on the distal, internal margin. All observed pleopodal rami lacking articulations. Uropods with basis bearing conical, dorsal tubercle. Endopod rugose, with a blunt, distal, posterior spine; antero-medial margin smoothly rounded; posterior margin uneven. Exopod one and a half times length of endopod, sub-cylindrical, rugose, acute tip lacking accessory spine.

Body length: 4.23 mm.

#### OVIGEROUS FEMALE (Fig. 3 l, m)

Body sub-elliptical, setose; lateral pereonal margins strongly convex. Pleotelson with low, median tubercle. Sub-circular foramen directed postero-dorsally, enclosed ventrally forming a tube. Uropod with rami sub-equal, smoothly rounded apically.

Body length: 4.23 mm.

#### REMARKS

The similarity between *D. ramuscula*, as figured by Baker (1908) and *D. bifida* from the Mediterranean has been mentioned in the literature (Monod 1932, Holdich 1968a). In fact these two species can be easily separated by the very different nature of the pleotelsonic ornamentation of the males (that of *D. bifida* being restricted to a single, central, low, bifid boss) and by the form of the posterior pereonal projections in the male (those of *D. bifida* being sub-parallel, separate at the base and not markedly divergent).

ETYMOLOGY: *Dynamene* + *L. ramuscula* i.e. branching, like a twig.

#### DISCUSSION

The occurrence in Australia of a second species of *Dynamene* is very noteworthy. Previously, only *D. ramuscula* from South Australia was known. This species has only been recorded once. Examination of specimens of *D. bifida* and *D. ramuscula* have shown conclusively that, on morphological grounds, they are distinct species.

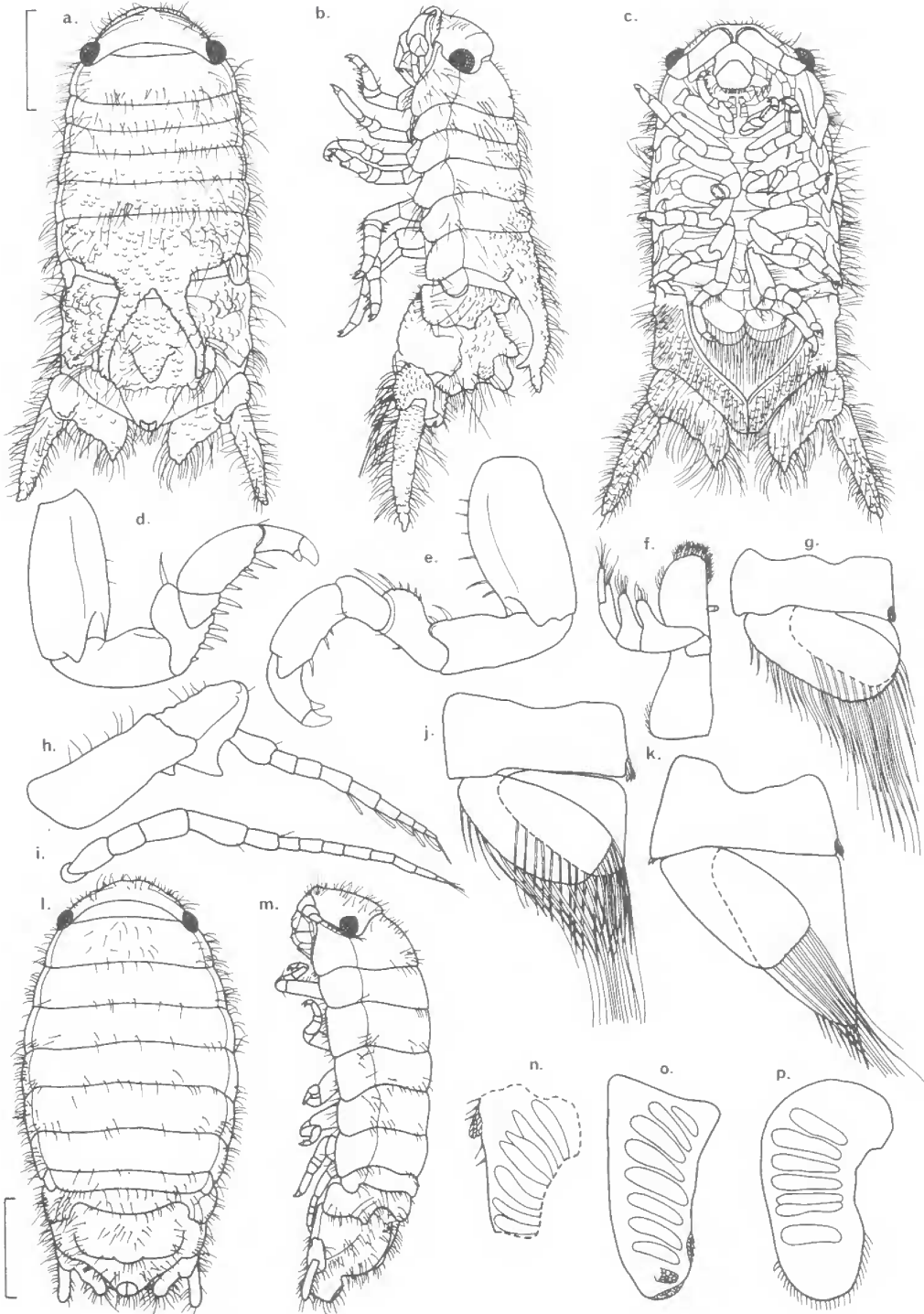


FIG. 3: *Dynamene ramuscula* Baker. Adult male (a) dorsal, (b) lateral, (c) ventral, (d) pereopod 1, (e) pereopod 3, (f) maxillipede, (g) antennule, (h) antenna, (i) antenna, (j, k) pleopods 1–3 respectively, (n) proximal external margin of damaged exopod of pleopod 4, (o) exopod of pleopod 5, (p) endopod of pleopod 5. Ovigerous female (l) dorsal, (m) lateral. Scales represent 1 mm.

*D. curallii* sp. nov. is the first species of the genus *Dynamene* to be recorded for sub-tropical and tropical habitats in the Southern Hemisphere. In the Northern Hemisphere only *D. edwardsi* has been recorded from within the tropics.

During the present study it was noted that in the two Australian species the coxal plates of pereonite 7 of the adult males have smoothly rounded posterior margins. This contrasts markedly with the strongly bidentate margins found in all the Afro-European species and clearly separates the two geographical groups. Males of *D. ramuscula* can easily be separated from those of *D. curallii* by the structure of the pleotelsonic ornamentation and pereonal spines, and by the absence of a tubercle on the postero-lateral tergal margin of pereonite 6 of *D. curallii*. Other factors separating the two species are: the shape of the epistome (that of *D. ramuscula* being acute and that of the new species being transverse); the relative width of that region of the cephalosome lying between the antennular bases (that of *D. ramuscula* being proportionally much narrower than that of the new species); and the relative lengths of the postero-ventral pleotelsonic shelf (that of *D. ramuscula* being proportionally shorter than that of the new species).

*Dynamene* is a common component of the epifauna of seaweeds and the infauna of rock crevices, empty barnacle tests and sponges in the Mediterranean and adjacent seas and on the Atlantic coasts of Western Europe and NW. Africa. In its reproductive habitat at least it has few isopod competitors. However, in other geographical locations its intertidal niche is often filled by *Dynamenella* spp. This is also the case on the Queensland mainland coast and in the intertidal zone of continental islands, such as Lizard Island. Three species of *Dynamenella* were found (Holdich, unpubl. obs.) associated with the rocky intertidal zone on Lizard Island but *D. curallii* was only found associated with the coral reef. On Heron Island, however, where the bulk of the intertidal zone is composed of coral, *Dynamenella* was restricted to the upper eulittoral beach rock.

The apparent discontinuous geographical distribution of *Dynamene* may not in fact be so marked now that it is known that some members

of this genus occupy coral habitats. More intensive collecting is needed in the Indo-Pacific coral habitat to show whether this is the case or not.

#### ACKNOWLEDGMENTS

Thanks are due to the Nuffield Foundation for a Fellowship in Tropical Marine Biology to D.M. Holdich, to the Natural Environment Research Council for a research grant, and the Directors of the Heron Island and Lizard Island Research Stations for provision of research facilities. Thanks are also due to Dr W. Zeidler (South Australian Museum) for the loan of specimens of *D. ramuscula*, and to N. Bruce and B. Barnett for the gift of specimens of the new species described here.

#### LITERATURE CITED

- BAKER, W.H., 1908. Notes on some species of the isopod family Sphaeromidae, from the South Australian coast. *Trans. Roy. Soc. S. Australia* 32: 138-62.
- HALE, H.M., 1929. The crustaceans of South Australia Pt. 2: 269-310. 'Handbooks of the flora and fauna of South Australia.' (British Science Guild, S. Australia Branch: Adelaide).
- HOLDICH, D.M., 1968a. A systematic revision of the genus *Dynamene* (Crustacea: Isopoda), with descriptions of three new species. *Publ. Staz. zool. Napoli* 36: 401-26.
- 1968b. Reproduction, growth and bionomics of *Dynamene bidentata* (Crustacea, Isopoda). *Proc. zool. Soc. Lond.* 156: 137-53.
1970. The distribution and habitat preferences of the Afro-European species of *Dynamene* (Crustacea: Isopoda). *J. nat. Hist.* 4: 419-38.
1976. A comparison of the ecology and life cycles of two species of littoral isopod. *J. exp. mar. Biol. Ecol.* 24: 133-49.
- HOLDICH, D.M. and HARRISON, K., 1980. The isopod genus *Gnathia* Leach from Queensland waters with descriptions of nine new species. *Aust. J. Mar. Freshwat. Res.* (in press).
- MONOD, T., 1932. Tanaidacés et Isopodes aquatiques de l'Afrique occidentale et septentrionale. Pt. 3. Sphaeromatidae. *Mem. Soc. Sci. Nat. Maroc.* 29: 1-91.
- NIERSTRASZ, H.F., 1931. Die Isopoden der Siboga-Expedition. 3. Isopoda Genuina. 2. Flabellifera. In WEBER, M., *Siboga-Expedite*. No. 114. (Monogr. 32c): 123-233.